BEST MANAGEMENT PRACTICES MANUAL

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CHAPTER 1 TEMPORARY EROSION CONTROL MANAGEMENT

1.1 Introduction

The requirement that erosion control be initiated on all exposed soil surfaces within a given timeframe is an integral compliance component on virtually all construction and maintenance projects. Temporary erosion control best management practices (BMPs) are short-term measures that should only be considered during a period where areas are disturbed due to construction. When an emergency such as a slide or flood occurs, a temporary BMP should facilitate erosion protection, or at least be compatible with, long-term or permanent BMPs.

A temporary erosion control BMP is normally used for 1—6 months, or until a more permanent BMP is put into place. Temporary BMPs are used to reduce or eliminate erosion and are designed and installed to keep as much sediment on-site as possible.

The proper use of temporary BMPs allow for cleaner water runoff into the receiving waters such as streams, rivers, and lakes. Erosion control is the primary and initial consideration in a construction soil-disturbing project. If erosion control is performed correctly, there should be little or no sediment collection needed.

1.2 Erosion Control Goals

Erosion control goals can be separated into three categories.

1. **Perimeter Controls**
   a. Ensure that no sediment, or only a minimal amount, enters or leaves the project area.
   b. Treat or filter sediment-laden discharge waters as many times as possible needed to meet standards, before leaving the project area.
2. **Controls within the Project**
   a. Maintain erosion control on cut-and-fill slopes and in the ditches or channels.
   b. Prevent erosion on undisturbed areas.
   c. Divert stormwater away from the project, and especially disturbed areas.
   d. Protect all bodies of water (ponds, streams, wetlands, etc.).
3. **Final Product**
   a. Coordinate all temporary erosion controls to facilitate permanent measures.

1.3 Best Management Practices (BMP)

Erosion control involves the use of the following BMPs:

	Typical Highway Construction Activities																											
Temporary Sediment Control Management **Best Management Practices**	Demolish Pavement/Structures	Clear and Grub	Construct Access Road	Grading (inc. cut and fill slopes)	Channel Excavation	Channel Paving	Trenching/Underground Drainage	Underground Drainage Facility Installation	Drainage Inlet Modification	Utility Trenching	Utility Installation	Subgrade Preparation	Base Paving	AC Paving	Concrete Paving	Saw Cutting	Joint Sealing	Grind/Groove	Structure Excavation	Erect Falsework	Bridge/Structure Construction	Remove Falsework	Striping	Miscellaneous Concrete Work	Sound Walls/Retaining Walls	Planting and Irrigation	Contractor Activities	Treatment BMP Construction
EC-1 Scheduling/Sequencing of Construction Activities	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X
EC-2 Preservation of Existing/Natural Vegetation		X	X	X			X	X		X									X	X		X			X			
EC-3 Coffer Dam			X		X		X														X							
EC-4 Diversion Channels/Ditches		X	X	X																	X							
EC-5 Slope Drains				X																	X							
EC-6 Hydraulic Mulch	X	X		X	X																X					X		X
EC-7 Hydroseeding	X	X		X	X																X					X		X
EC-8 Soil Binders	X	X		X	X														X		X					X		X
EC-9 Straw Mulch	X	X	X	X	X		X	X		X		X							X		X					X		X
EC-10 Wood Mulching	X	X	X	X	X		X	X		X		X							X		X					X		X
EC-11 Geotextiles, Plastic Covers & Erosion Control	X	X	X	X	X		X	X		X		X							X		X					X		X

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Blankets/Mats																													
EC-12 Vegetation/Seeding		X		X																						X		X
EC-13 Dust Control	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X				X					
EC-14 Wind Erosion Control		X	X	X	X		X			X		X	X	X	X											X		X
EC-15 Snow Management		X																									X	
EC-16 Snow Accumulation Management																											X	

EC-1 SCHEDULING/SEQUENCING OF CONSTRUCTION ACTIVITIES

Refer to: ITD Standard Specifications, Sections 108.02 and 212.

Definition and Purpose

- A critical factor in reducing erosion and subsequent sedimentation on construction projects is scheduling or planning the sequence of work at appropriate times or seasons. Another important factor is minimizing the total amount of disturbed soil exposed to erosion at any time. Large areas of disturbance could lead to additional water quality monitoring compliance requirements on your project.
- Proper scheduling of construction during periods when the potential for erosion is low and the effectiveness of erosion control measures is high will greatly reduce sediment loads due to runoff. The amounts of disturbed ground exposed at any one time before erosion control measures are put in place will always influence the amount of erosion and sediment loss.

BMP Objectives

- ☒ **Perimeter Control**
- ☒ **Slope Protection**
- ☒ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
- ☒ **Sediment Trapping**
- ☒ **Stream Protection**
- ☒ **Temporary Stabilizing**
- ☒ **Permanent Stabilizing**

Appropriate Applications

Scheduling or sequencing is especially relevant to:

- Projects where ground is disturbed to facilitate construction.
- Large projects where work activities can be planned to coincide with periods of low erosion potential.
- Projects where an NPDES permit is required.

Limitations

- Contractor work scheduling may not coincide with the schedule that was anticipated during the design of the project or current weather conditions.
- Seasonal limitations are not always possible to incorporate, due to bidding, letting, timing, and administration of contracts.

- Certain environmental permits and their requirements may contain restrictions on scheduling or sequencing of certain work activities and the maximum allowable exposure of surface area.

Design Parameters

- SWPPP requirements shall be included to clarify allowable parameters. Erosion potential and maximum area that can be exposed at any time should be evaluated based on specified criterion cited in the NPDES Permit and contract specifications, and consideration of terrain, soil type, season of work, and current and forecasted weather conditions.
- Required erosion control measures and exposure of surface area should be specified in the work scheduling, SWPPP, and project plans and specifications.
- Whenever possible, construction work should be scheduled during seasonal low runoff periods and under favorable soil moisture conditions. Erosion control measures should be scheduled or timed in stages to coincide with construction sequencing.

Construction Guidelines

- The Contractor shall develop a schedule and work plan indicating sequence of activities. The Contractor shall schedule construction activities when the potential for erosion is low and allow time for installation of erosion control measures as the work progresses.
- Check for excessive clearing, grubbing, or grading that is beyond the Contractor's capability to manage erosion and install erosion and sediment control measures in an effective manner.
- Minimize the length of time between bare ground exposure and the installation of erosion and sediment control measures. Areas should only be disturbed as needed or intended for specific construction work or related staging activities.

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- Maintain appropriate erosion and sediment control measures with construction sequencing.

EC-2 PRESERVATION OF EXISTING/NATURAL VEGETATION

For assistance, contact the District Environmental Planners and the Roadside Program Administrator at ITD Headquarters Maintenance Section.
Refer to: ITD Standards and Specifications for Highway Construction, Section 201.

BMP Objectives

- ☒ **Perimeter Control**
- ☒ **Slope Protection**
- ☐ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
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- ☒ **Permanent Stabilizing**

Definition and Purpose

The key component to long-term permanent erosion control on roadsides is a diversified stand of well-established perennial vegetation. To achieve this objective, existing vegetation should be preserved and left undisturbed as much as possible. Established vegetated areas provide buffer strips, stabilize ground surfaces and slopes, reduce runoff, and filter stormwater, as well as protect water quality and aesthetics.

Preservation of existing/natural vegetation (grass, forbs, shrubs, and trees) should be considered on all projects with ground disturbing activities. The easiest and most cost-effective way to preserve vegetation is to retain well-established vegetation. Specific vegetated areas may be set aside between clearing limits and rights-of-way. If removal of vegetation is not necessary beyond the grading area (see the Standard Specifications), then existing vegetation shall be left undisturbed.

Appropriate Applications

Vegetated areas within the grading area shall be retained whenever possible. Preserving vegetation can be beneficial for: flood plains, roadside ditches and channels, wetlands, stream banks, steep slopes, staging areas, and other special areas where erosion control is critical and measures would be difficult to establish, install, or maintain.

Limitations

- Preservation of natural vegetation may be impractical in some situations because the vegetation may interfere with or constrict the area within which construction activities take place, or may not be cost effective.
- Local, state, or federal regulations may require specific vegetation to be preserved and protected, including species of concern, threatened or endangered species, and candidate species. The Contractor and ITD personnel shall consult with the appropriate agencies

including but not limited to the Idaho Fish and Game (Conservation Data Center), U.S. Fish and Wildlife Service, NOAA-Fisheries, Idaho Department of Lands, and the Idaho Native Plant Society for more information. These species are generally handled through the Environmental Document and may include USFS, BLM, and Tribal Land.

Design Parameters

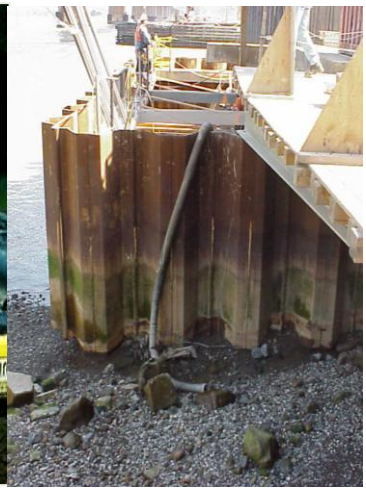
- All construction projects should be designed to preserve existing vegetation to the extent possible or practicable. ***Areas that will be established for preserving natural vegetation should be clearly identified and delineated in the plans and specifications. They shall also be incorporated into the SWPPP.*** Preservation activities may involve work staging or sequencing, the installing perimeter or other controls, and other considerations that will preserve existing natural vegetation in certain areas where it would otherwise be removed.
- The Contractor and ITD personnel shall minimize the impact of construction activities on existing vegetation and check the project plans and SWPPP for areas designated for vegetation preservation.
- The inspector shall clearly mark and flag the preserved areas in the field.
- The Contractor shall ensure that existing vegetation remains healthy and undamaged. The Contractor shall replace all damaged vegetation.
- The Contractor and ITD personnel shall keep all construction equipment, materials, and waste out of the designated areas and prevent unauthorized traffic from disturbing the vegetated area.
- Whenever possible, existing drainage patterns through or into the natural area shall left unmodified.

Maintenance and Inspection

Conduct inspections as required by the NPDES permit or contract specifications.

EC-3 COFFER DAM

Refer to: ITD Standards and Specifications for Highway Construction, Sections 210 and 501.



Standard Symbol to be developed.

Definition and Purpose

A coffer dam is a temporary structure built into a waterway to contain or divert movement of water and to provide a reasonably dry construction area. Coffer dams are commonly made of steel sheet pile, rock, gabions, concrete jersey barriers, vinyl tubes filled with water, or wood and may be lined with geotextile, plastic sheeting, or other materials to prevent water from entering the construction area.

BMP Objectives

- ☐ **Perimeter Control**
- ☐ **Slope Protection**
- ☐ **Borrow and Stockpiles**
- ☐ **Drainage Areas**
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- ☐ **Temporary Stabilizing**
- ☐ **Permanent Stabilizing**

Appropriate Applications

Coffer dam construction may be required for activities such as stream alteration or construction of bridges, piers, or abutments that involve excavation or placement of soil and rock within a body of water.

Limitations

- Under some conditions, the design must be developed or approved by a qualified licensed engineer.
- The coffer dam should be sturdy enough to withstand water pressure and scouring.
- The use of a coffer dam below the high water mark of a stream or other water body (waters of the U.S.) should be carefully evaluated in coordination with the Corps of Engineers Section 404 permit. A Section 404 permit, IDEQ 401 Certification will be required. An Idaho Department of Water Resources Stream Alteration Permit may also be required.

Design Parameters

- Coffer dams should be designed to withstand currents and scour conditions expected under normal stream flow and annual high water. The useful life expectancy is generally 6 months or less.

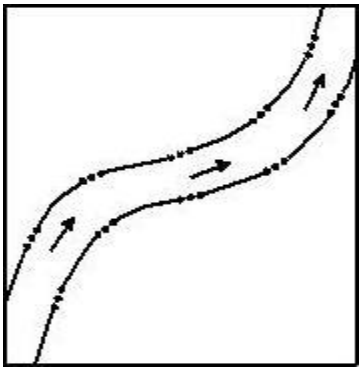
- Specific design is not required for a coffer dam, except where any one or more of the following applies:
  - The coffer dam will provide support for earth pressures.
  - Hydrostatic pressures are not equal.
  - Waters are deep or rough.
  - Life may be endangered, due to coffer dam failure.
  - Where the coffer dam is to be 5 feet or higher.
- Construction materials commonly include steel sheet piles, rock, vinyl tubes, or wood. Piling could consist of standard steel sheet interlocked and driven into the soil or anchored to bedrock. Wooden structures may consist of planks or wood timbers. Concrete jersey barriers may be used, depending on the anticipated water flow, depth and appropriate fit and contact with the stream bed.
- The water side of the coffer dam may be lined with plastic sheeting or some other suitable material that would prevent water passage into the construction area.
- The coffer dam should be designed by a professional engineer, when required, or as shown on the plans. Field adjustments shall be made as necessary. Vinyl tubes (bladders) shall be installed following manufacturer's recommendations and guidelines. Rocks or sharp objects shall be removed prior to installation.

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- Remove accumulated sediment and debris regularly and just prior to removing the coffer dam.
- Upon removal of the coffer dam, stabilize the area and streambed and restore to as near-natural condition as possible. This may require some form of rock riprap and permanent revegetation if the stream bank has been disturbed.

EC-4 DIVERSION CHANNELS/DITCHES

Refer to: ITD Standards and Specifications for Highway Construction, Section 212.
ITD Standard Drawing P-1-D.



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Definition and Purpose

Diversion channels or ditches are small excavations for diverting overland flow away from exposed slopes, conveying the water to where it can be safely discharged through a stabilized outlet or to a sediment basin.

BMP Objectives

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- ☒ **Slope Protection**
- ☐ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
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Appropriate Applications

- Diversion channels or ditches are used above the top of slopes, at the toe of slopes or embankments, in material sources, and at waste sites to collect and divert runoff.
- Temporary diversion channels or ditches can be used on the lower side of cleared areas that are awaiting excavation. They can also be used along benches on large slope faces to prevent collected runoff from flowing onto slope faces downslope and to reduce the length of an uninterrupted slope face on un-benched slopes.
- A diversion channel or ditch may be used in conjunction with a berm or dike. Flows concentrated by a diversion channel or ditch and dike or berm should be discharged using chutes, flumes, or slope drains.

Limitations

- Mechanical stabilization may be required for temporary channels or ditches with a gradient in excess of 50 percent (channel or ditch slope steeper than 2H:1V) and for large flows or highly erodible soils.
- Conditions of an NPDES permit and/or a 404 permit may apply.

Design Parameters

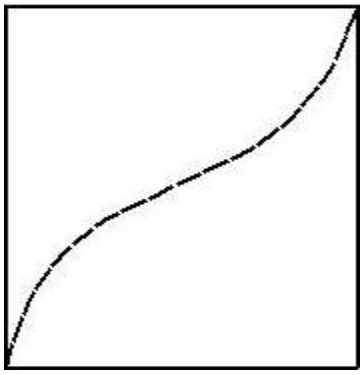
- The diversion outlet may be discharged to a non-wetland (preferably vegetated) area, sediment basin, an artificially stabilized area, or to a slope drain, chute, or flume. The diverted runoff should not be allowed to overtop the dike or lip of the ditch. Discharge should be to a flat or gently sloping area.
- Side slopes of the channel or ditch should be 2H:1V or flatter, and the grade should be gradual.
- The diversion channel or ditch may consist of a trench and a dike or berm. If a berm or dike is used, it should be compacted as specified.
- Diversion channels/ditches may be constructed with or without a supporting berm or dike on the downslope side.
- Other sediment-control measures, such as sediment basins, ditch checks, etc., may be required to filter or trap sediment before the runoff leaves the site.
- Field adjustments shall be made as necessary to ensure proper performance.

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- Repair damaged areas immediately, and remove obstructions.
- Remove the channel or ditch, if required. The area feeding runoff to the channel or ditch shall be permanently stabilized before the channel or ditch is removed.

EC-5 SLOPE DRAINS

Refer to: ITD Standards and Specifications for Highway Construction, Sections 212 and 706.
ITD Standard Drawing P-1-A.



Standard Symbol

BMP Objectives

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Definition and Description

- A slope drain is installed to transport concentrated runoff from the top of a slope to a sediment basin, ditch, or a channel, at the toe of the slope. Water is collected above a disturbed slope (cut or fill) and directed to a collection point at the inlet of the slope drain.
- The use of the slope drain prevents accumulated runoff to flow over slopes that are at high risk of erosion or slope failure. The discharge from the slope drain should be directed into a stabilized water course, riprap, or sediment basin.

Appropriate Applications

Slope drains are used primarily during construction whenever runoff needs to be diverted and conveyed down a slope without causing erosion. Temporary collection basins and slope drains should be used before the slope has been stabilized using a more permanent erosion and sediment control BMP. Slope drain applications may include the following:

- On cut or fill slopes before permanent stormwater drainage structures have been installed.
- Where earth dikes, berms, channels, or ditches have been installed to divert accumulated water from flowing on disturbed slopes.
- On any slope where concentrated runoff crossing the face of the slope may cause gullies, rills, channel erosion, or saturation of slide-prone soils.
- As an outlet for a natural drainage.

Limitations

The area to be drained through the slope drain should not exceed 10 acres.

Design Parameters

The drainage system, comprised of the diversion measures, inlet, and drain, should be:

- Designed (pipe sizing and spacing) to handle the peak runoff for a 10-year storm event
- Plastic sheeting, fiber mats, or riprap with a prefabricated collection inlet can be used on a temporary basis.

Construction Guidelines

- Install the inlet section of the slope drain at points where water is discharged from ditches, channels, berms, dikes, or other points of concentrated flow.
- Place erosion control geotextiles under the inlet, extend 3.5 to 6.5 feet in front of the inlet, and key in at least 6 inches on all sides to prevent erosion.
- Funnel the flow into the drain. Cross berms and a sediment basin may be needed ahead of the inlet.
- Compact soil around and under the inlet section to the top of the dike or berm to prevent piping failure or undercutting around the inlet.
- Ensure that the finished grade at the inlet is a minimum of 6 inches above the top of the slope drain.
- Place the slope drain on firm, well-compacted soil.
- Anchor all drains to the slope at intervals of 10 feet or less, using anchors, stakes, etc., to prevent disruption by water or other forces.
- Fasten the slope drain sections securely together and have watertight fittings.
- Extend the pipe beyond the toe of the slope and discharge into a stabilized area or to a sediment basin or pond. Use riprap at the discharge or outlet area to reduce erosion.
- Immediately stabilize the areas disturbed by installation or removal of the slope drain.
- Make field adjustments as necessary to ensure proper performance.

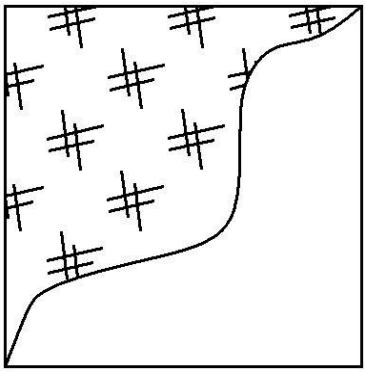
Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- Keep construction traffic off the slope drain, and do not place any material on it.
- If necessary, install headwalls or sandbags to prevent bypass flow. Make necessary repairs immediately.
- Install additional outlet protection if needed, and immediately repair breaks and clean out any debris.
- Clean the sediment basin, if provided, when the sediment level reaches one-half the design volume, and dispose of properly.

- Leave the slope drain in place until the slope has been completely stabilized, or replace with a more permanent slope stabilization measure.
- Remove the temporary slope drain, as designated before final acceptance of the project (performed by the Contractor).

EC-6 HYDRAULICALLY APPLIED EROSION CONTROL PRODUCTS

Refer to: ITD Standards and Specifications for Highway Construction, Sections 212, 621 and 711.
QPL Category: 621 Erosion Blanket – Liquid Mixture (HECPs)



Standard Symbol

Definition and Purpose

Hydraulically applied erosion control products consists of applying a mixture of cut or shaved wood fiber or a bonded fiber matrix and a stabilizing emulsion or tackifier with hydro-mulching equipment, which temporarily protects exposed soil from erosion by raindrop impact or wind..

BMP Objectives

- ☐ **Perimeter Control**
- ☒ **Slope Protection**
- ☒ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
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- ☒ **Permanent Stabilizing**

Appropriate Applications

Hydraulically applied erosion control products are applied to disturbed areas requiring temporary protection until permanent vegetation is established or disturbed areas that must be disturbed again following an extended period of inactivity.

Limitations

- Wood fiber hydraulic mulches are generally short-lived (only last part of a growing season) and need 24 hours to dry before rainfall occurs to be effective.
- Use should be avoided in areas where the mulch would be incompatible with future earthwork activities and would have to be removed.

Design Parameters

- Prior to application, embankment and fill areas should be rolled with a crimping or punching type roller or track walked. Track walking shall only be used where other methods are impractical.

- Hydraulically applied erosion control product over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation shall be avoided.
- Hydraulically applied erosion control products shall be applied per the manufacturer's recommendations.
- **Hydraulic Mulch** is a hydraulically-applied material containing defibrated paper, wood and/or natural fibers that may or may not contain tackifiers used to provide erosion control and facilitate vegetation establishment on MILD SLOPES (3H:1V max.) and designed to be functional for up to 3 months. Wood mulch is typically applied at the rate of 2,000 to 4,000 pounds/acre. Wood mulch is manufactured from wood or wood waste from lumber mills or from urban sources.
- **Stabilized Mulch Matrices (SMM)** are a hydraulically-applied matrix containing defibrated organic fibers with, at a minimum, one of the following additives: soil flocculants, crosslinked hydro-colloidal polymers, or crosslinked tackifiers. Utilized to provide erosion control and facilitate vegetation establishment on MODERATE SLOPES (2H:1V max.) and designed to be functional for a minimum of 3 months. SMM are applied as a liquid slurry using a hydraulic application machine (i.e., hydro-seeder) at the following typical minimum rates, or as specified by the special provisions, to achieve complete coverage of the target area: 750 pounds/acre wood fiber mulch and 55 gallons/acre of acrylic copolymer.
- **Bonded Fiber Matrices (BFM)** are a hydraulically-applied matrix of organic defibrated fibers and cross-linked insoluble hydro-colloidal tackifiers to provide erosion control and facilitate vegetation establishment on STEEP SLOPES (1H:1V max.) and designed to be functional for a minimum of 6 months. BFMs form an erosion-resistant blanket that promotes vegetation and prevents soil erosion. BFMs are typically applied at rates from 3,000 to 4,000 pounds/acre based on manufacturer's recommendation (the biodegradable BFM is composed of materials that are 100 percent biodegradable). The binder in the BFM should also be biodegradable and should not dissolve or disperse upon re-wetting. Typically, biodegradable BFMs should not be applied immediately before, during, or immediately after rainfall if the soil is saturated.
- **Fiber Reinforced Matrices (FRM)** are a hydraulically-applied matrix containing organic defibrated fibers, cross-linked insoluble hydro-colloidal tackifiers, and reinforcing natural and/or synthetic fibers to provide erosion control and facilitate vegetation establishment on VERY STEEP SLOPES (0.5H:1V max.) and designed to be functional for a minimum of 12 months.

Qualified Products List Criteria

All hydraulically applied erosion control products shall meet the State of Idaho State Department of Agriculture Seed Laboratory or the North American Weed Management Association (NAWMA) noxious weed-free certification requirements prior to approval.

Laboratory and field testing results supporting the manufacturer's data shall be provided from one of the following and meet the criteria in Table 1 below.

- Utah Water Research Laboratory (UWRL)

- San Diego State University/Soil Erosion Control Laboratory (SDSU/SERL)
- Texas Transportation Institute (TTI)

Table 1
Hydraulically Applied Erosion Control Products, Qualified Products List Criteria

	Hydraulic Mulch	Stabilized Mulch Matrix	Bonded Fiber Matrix	Fiber Reinforced Matrix	Fiber Reinforced Matrix Extended
ASTM 7322 - Ability to Encourage Seed Germination and Plant Growth	200% min.	400% min.	600% min.	800% min.	500% min.
ASTM 7367 - Water Holding Capacity	900% min.	1300% min.	1400% min.	1500% min.	1500% min.
ASTM D 6818 - Wet Bond Strength	N/A	4.5 lb/ft	4.5 lb/ft	4.5 lb/ft	4.5 lb/ft
ASTM 7101 - EPA 2021.0 (96 hr LC50)	>100%	>100%	>100%	>100%	>100%
ASTM D 5338 - Plastic Aero Biodegradability	100%	100%	100%	100%	100%
ASTM D 2974 - Organic Material	90% min.	90% min.	90% min.	90% min.	90% min.
ASTM D 6566 - Mass per Unit Area	N/A	9.5 oz/yd	11.5 oz/yd	11.5 oz/yd	11.5 oz/yd
ASTM D 6525 - Thickness	N/A	0.10 in	0.12 in	0.17 in	0.21 in
ASTM D 6567 - Ground Cover	N/A	95%	97%	99%	99.9%
ASTM 6459 - C Factor	0.15 max.	0.15 max.	0.15 max.	0.15 max.	0.15 max.
EcoToxicity - EPA - 821 - R - 02-012 measuring acute toxicity of effluents. Test leachate from recommended application rate receiving 2 inches of rain per hour using static test for Non Observed-Adverse-Effect-Concentration (NOEC)	NOEC	NOEC	NOEC	NOEC	NOEC
Longevity	1-3 months	3-6 months	6-12 months	12-18 months	18-24 months

All hydraulically applied erosion control products shall also meet the following criteria:

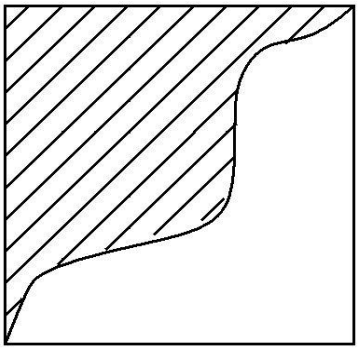
- Shall be degradable and free of chemical printing ink, germination inhibitors, herbicide residue, chlorine bleach, rock, metal, plastic, and other materials detrimental to plant life.
- May have up to 5 percent by weight photodegradable material.
- Shall be suitable for spreading with a hydroseeder.
- Shall be manufactured in such a manner that when agitated in slurry tanks with water, the fibers will become uniformly suspended, without clumping, to form a homogeneous slurry.
- All dyes shall be non-toxic to plants, animals, and aquatic life and shall not stain concrete or painted surfaces.
- Shall be furnished with a Material Safety Data Sheet (MSDS) that demonstrates that the product is not harmful to plants, animals, and aquatic life.

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked. Repair any damaged ground cover and re-mulch exposed areas of bare soil.
- The Contractor is responsible for maintaining all slopes to prevent erosion.

EC-7 HYDROSEEDING

Refer to: ITD Standards and Specifications for Highway Construction, Sections 621 and 711.



Standard Symbol

Definition and Purpose

Hydroseeding typically consists of applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, which temporarily protects exposed soils from erosion by water and wind.

BMP Objectives

- ☐ **Perimeter Control**
- ☒ **Slope Protection**
- ☒ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
- ☐ **Sediment Trapping**
- ☐ **Stream Protection**
- ☒ **Temporary Stabilizing**
- ☒ **Permanent Stabilizing**

Appropriate Applications

Hydroseeding is applied on disturbed areas requiring temporary protection until permanent vegetation is established or disturbed areas that must be disturbed again following an extended period of inactivity.

Limitations

- Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control. Otherwise, hydroseeding must be used in conjunction with a soil stabilizer or mulching.
- Steep slopes are difficult to protect with temporary seeding.

Design Parameters

- In order to select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:
  - Soil conditions
  - Maintenance requirements
  - Site topography

  - Sensitive adjacent areas
  - Season and climate
  - Water availability
  - Vegetation types
  - Plans for permanent vegetation
- Selection of hydroseeding mixtures shall be approved by a landscape architect.

The following steps shall be followed for implementation:

- Hydroseeding can be accomplished using a multiple- or one-step process. The multiple-step process ensures maximum direct contact of the seeds to soil. When the one-step process is used to apply the mixture of fiber, seed, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil.
- Prior to application, the slope, fill area, or area to be seeded shall be roughened with the furrows trending along the contours.
- A straw mulch shall be applied to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- Each seed bag shall be delivered to the site sealed and clearly marked with species, purity, percent germination, dealer's guarantee, and dates of test. This documentation shall be provided to the Engineer. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed shall be pellet-inoculated. Inoculant sources shall be species-specific and shall be applied at a typical rate of 2 kg of inoculant per 100 kg of seed (2 percent inoculant by weight).
- Fertilizer shall be pelleted or granular form.
- Follow-up applications shall be made as needed to cover weak spots and to maintain adequate soil protection.
- Over-spray onto the travel way, sidewalks, lined drainage channels and existing vegetation shall be avoided.

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- All seeded areas shall be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates. Any temporary revegetation efforts that do not provide adequate cover must be reapplied as required.
- The Contractor is responsible for maintaining all slopes to prevent erosion.

EC-8 SOIL BINDERS

Refer to: ITD Standards and Specifications for Highway Construction, Section 212.
QPL Category: 212 Soil Binder

BMP Objectives

- ☐ **Perimeter Control**
- ☒ **Slope Protection**
- ☒ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
- ☐ **Sediment Trapping**
- ☐ **Stream Protection**
- ☒ **Temporary Stabilizing**
- ☒ **Permanent Stabilizing**

Definition and Purpose

Soil stabilizers are applied to exposed or disturbed soil to reduce wind and water erosion, typically as a final treatment when construction activity has ceased.

Dust palliatives are used during construction to reduce dust emissions due to mechanical and wind forces, and typically do not have the longevity of soil stabilizers.

Appropriate Applications

Soil stabilizers are applied where specified in the contract plans or as directed by the engineer. Dust palliatives are typically applied at the Contractor's discretion to disturbed areas requiring short-term temporary protection for erosion control/dust control and to comply with air quality standards. Because dust palliatives can often be incorporated into the work, they may be a good choice for areas where grading activities will soon resume. They can be applied on stockpiles to reduce water and wind erosion.

Limitations

- Soil stabilizers and dust palliatives are temporary in nature and may need reapplication.
- Soil stabilizers and dust palliatives require a minimum curing time until fully effective, as prescribed by the manufacturer, which may be 24 hours or longer.
- Soil stabilizers and dust palliatives may need reapplication after a storm event and will generally experience spot failures during heavy rainfall. If runoff penetrates the soil at the top of a treated slope, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.
- Some soil stabilizers and dust palliatives do not hold up to pedestrian or vehicular traffic across treated areas. For traffic areas, be sure to select an appropriate product.

- Soil stabilizers and dust palliatives may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted.
- Some soil stabilizers and dust palliatives may have a deleterious effect on long-term landscaping.
- Some soil stabilizers and dust palliatives may not perform well with low relative humidity. Refer to manufacturers' literature for humidity limitations. Under rainy conditions, some agents may become slippery or leach out of the soil.
- May not cure if low temperatures occur within 24 hours of application. Refer to manufacturers' literature for temperature limitations.

General Considerations

- Site-specific soil types will dictate appropriate soil stabilizers or dust palliatives to be used.
- Soil stabilizers and dust palliatives must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and shall not stain paved or painted surfaces.
- Some products are compatible with existing vegetation.
- Performance of soil stabilizers and dust palliatives depends on temperature, humidity, and traffic across treated areas.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.

Selecting a Soil Stabilizer or Dust Palliative

Properties of common soil stabilizers and dust palliatives used for erosion control are provided in Tables 1 and 2. Use Table 1 to select a product for non-traffic applications, and Table 2 for traffic areas. Refer to EC-14 (Wind Erosion Control) for more information about dust control. Factors to consider when selecting a product include the following:

- Suitability to situation: Consider where the product will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time stabilization will be needed, and if the product will be placed in an area where it will degrade rapidly.
- Soil types and surface materials: Fines and moisture content are key properties of surface materials. Consider a soil stabilizer or dust palliative's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials. Soil information can be obtained from the project's geotechnical report or from a Natural Resources Conservation District (NRCS) website.
- Frequency of application: The frequency of application can be affected by subgrade conditions, surface type, climate, and maintenance schedule. Frequent applications could lead to high costs. Application frequency may be minimized if the dust palliative has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean-up.

Qualified Products List Criteria

Shall have a manufacturers' certification that it is nontoxic to plant or animal life and nonstaining to concrete or painted surfaces.

Plant-Material Based (Short-Lived)

Short-lived products may only be used as dust palliatives.

Guar: Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersing agents for easy field mixing. Typical recommended minimum application rates are as follows:

Typical Application Rates for Guar Soil Stabilizer

Slope (V:H):	Flat	1:4	1:3	1:2	1:1
lb/acre:	40	45	50	60	70
kg/ha:	45	50	56	67	78

Psyllium: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Typical application rates are 80 to 200 pounds/acre, with enough water in solution to allow for a uniform slurry flow.

Starch: Starch is non-ionic, cold-water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water. The typical application rate is 150 pounds/acre. Approximate drying time is 9 to 12 hours.

Plant-Material Based (Long-Lived)

Tall Oil Pitch/Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48 percent. The rosin shall be a minimum of 26 percent of the total solids content when included. The addition of rosin will strengthen the stabilizer, but also makes it more brittle and less UV resistant, decreasing its effective duration. The soil stabilizer shall be a non-corrosive, water-dilutable emulsion that upon application cures to a water-insoluble binding and cementing agent. Typical application rates will be per the manufacturer's recommendations for the given situation and required duration.

Lignin Sulfonate: Byproduct of the kraft paper-making process, it is a natural adhesive that holds plant fibers together. It greatly increases the dry strength of the soil, is not humidity-dependent, lowers the freezing point of the road, and retains its effectiveness after reblading. High solubility results in leaching during heavy precipitation. Lignin products have a high biochemical oxygen demand and should not be used where runoff could contaminate a body of water. A neutralizing additive must be added to reduce its corrosive effects to aluminum alloys.

Application can be by water truck or hydraulic seeder with the emulsion/product mixture application rate as specified by the manufacturer.

Polymeric Emulsion Blends

Acrylic Copolymers and Polymers: Polymeric soil stabilizers shall consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55 percent solids. The

polymeric compound shall be handled and mixed in a manner that will not cause foaming or shall contain an anti-foaming agent. The polymeric emulsion shall not exceed its shelf life or expiration date, which will be provided by the manufacturers Polymeric soil stabilizer shall be readily miscible in water, non-injurious to seed or animal life, non-flammable, shall provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and shall not re-emulsify when cured. The applied compound shall air-cure within a maximum of 36 to 48 hours. Liquid copolymer is typically diluted at a rate of 10 parts water to 1 part polymer and applied to soil at a typical rate of 1,175 gallons/acre.

Liquid Polymers of Methacrylates and Acrylates: This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100 percent acrylic emulsion blend of 40 percent solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water and typically applied with a hydraulic seeder at the rate of 20 gallons/acre. Drying time is 12 to 18 hours after application.

Copolymers of Sodium Acrylates and Acrylamides: These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and typically applied to the soil surface for erosion control at rates that are determined by slope gradient.

Slope Gradient (H:V)	lb/acre	kg/ha
Flat to 5:1	3.0 – 5.0	3.4 – 5.6
5:1 to 3:1	5.0 – 10.0	5.6 – 11.2
2:1 to 1:1	10.0 – 20.0	11.2 – 22.4

Poly-Acrylamide and Copolymer of Acrylamide (PAM): Linear copolymer polyacrylamide is packaged as a dry-flowable solid. PAM is used as a tie-down for soil, compost, or seed, and is also used as a flocculent. When used as a stand-alone stabilizer, it is typically diluted at a rate of 10 pounds/1,000 gallon of water and applied at a typical rate of 5.0 pounds/acre.

- The specific PAM copolymer formulation shall be anionic. Cationic PAM should not be used in any application because of known aquatic toxicity problems.
- Shall meet ANSI/NSF Standard 60 for drinking water treatment with an acrylamide (AMD) content not to exceed 0.05 percent.
- PAM designated for erosion and sediment control shall be “water soluble” or “linear” or “non-cross linked.”
- The minimum average molecular weight shall be greater than 5 mg/mole and minimum 30 percent charge density.
- Shall contain at least 80 percent active ingredients and have a moisture content not exceeding 10 percent by weight.

Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry-flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at typical rates of 50 to 60 pounds/acre. Drying times are 0 to 4 hours.

Cementitious-Based

Gypsum: This is a formulated gypsum-based product that readily mixes with water and sometimes mulch to form a thin protective crust on the soil surface. It is composed of high-purity gypsum that is ground, calcined, and processed into calcium sulfate hemihydrate with a minimum purity of 86 percent. It is mixed in a hydraulic seeder and applied at typical rates of 4,000 to 12,000 pounds/acre. Drying time is 4 to 8 hours.

Petroleum-Based

Petroleum Resin Emulsion: These products coat soil particles, increasing their mass and decreasing their likelihood of becoming airborne, but do not exhibit adhesive properties. They are water-insoluble once cured, and hence provide a degree of surface waterproofing and have good residual effectiveness. Used oils are prohibited as a soil stabilizers or dust palliatives, because they contain toxic substances. Petroleum resin products should only be used for traffic areas such as haul roads, parking, and staging areas.

Applying Soil Stabilizers and Dust Palliatives

After selecting an appropriate product, the untreated soil surface must be prepared before applying the soil stabilizer. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps shall be followed:

- Follow manufacturer's recommendations for application rates and pre-wetting of application area.
- Prior to application, roughen embankment and fill areas. Track walking shall only be used where rolling is impractical.
- Consider the drying time for the selected product and apply with sufficient time before anticipated rainfall. Generally, soil stabilizers and dust palliatives require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure times. Soil stabilizers and dust palliatives shall not be applied during or immediately before rainfall.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Soil stabilizers and dust palliatives shall not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the air temperature is below 4°C (40°F) during the curing period.
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate. Follow the manufacturer's application instructions.
- For liquid agents:
  - Crown or slope ground to avoid ponding.
  - Uniformly pre-wet ground at 0.03 to 0.3 gallon/square yard or according to manufacturer's recommendations.
  - Apply solution under pressure. Overlap solution 6 to 12 inches.

- Allow treated area to cure for the time recommended by the manufacturer; typically, at least 24 hours.
- In areas with low humidity, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gallon per square yard.

Maintenance and Inspections

- Conduct inspections as required by the NPDES permit or contract specifications.
- Reapply the selected soil stabilizer for proper maintenance, as needed.
- After any rainfall event, maintain all slopes to prevent erosion.
- Maintain any unbroken, temporary mulched ground cover while disturbed soil areas are non-active. Repair any damaged ground cover and re-mulch exposed areas.
- Follow manufacturer's recommendations for maintaining and cleaning equipment after use.
- Maintenance and repair applications shall be included in the bid price.

Table 1
Properties of Soil Stabilizers for Erosion Control (Non-Traffic Areas)

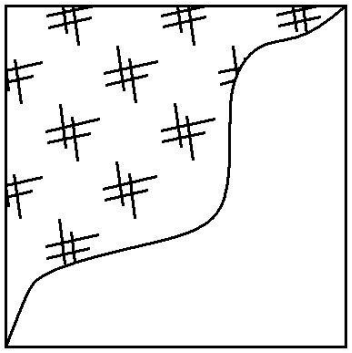
Chemicals	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Stabilizers
Relative Cost	Low	Low	Low	Low
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean-Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies	Varies	Varies	4,500 to 13,500 L/Ha

Table 2
Properties of Soil Stabilizers for Erosion Control (Traffic Areas)

Chemicals	Ligninosulfonate	Tall Oil Pitch Emulsion	Petroleum Resin Emulsion
Relative Cost	Moderate	Moderate	Moderate
Resistance to Leaching	Low	High	High
Longevity	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	24 hours +	30-60 min (Prime Coat) 8-24 Hours (Mixed Into Base)	0-4 hours
Mode of Degradation	Biodegradable	Biodegradable	Photo/Chemically Degradable
Labor Intensive	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes
Clean-Up	Water	Water, before it dries	Water, before it cures

EC-9 STRAW MULCH

Refer to: ITD Standards and Specifications for Highway Construction, Sections 212, 621, and 711.



Standard Symbol

Definition and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a tackifier stabilizing emulsion.

BMP Objectives

- ☐ **Perimeter Control**
- ☒ **Slope Protection**
- ☒ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
- ☐ **Sediment Trapping**
- ☐ **Stream Protection**
- ☒ **Temporary Stabilizing**
- ☒ **Permanent Stabilizing**

Appropriate Applications

- Straw mulch is typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established.
- Also typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

- Availability of erosion control contractors and straw may be limited prior to the rainy season due to high demand.
- There is a potential for introduction of weed-seed and unwanted plant material.
- When straw blowers are used to apply straw mulch, the treatment areas must be within 150 feet of a road or surface capable of supporting trucks.
- Straw mulch applied by hand is more time-intensive and potentially costly.
- May have to be removed prior to permanent seeding or soil stabilization.
- Application of straw mulch should be performed in calm conditions with wind speeds below 8 mph.

- When working in sandy soils, pushing the straw into the soils with shovels, discs, or other equipment has limited effectiveness. Other methods, such as the use of tackifiers, should be considered to secure the mulch in place.

Design Parameters

- Straw shall be derived from wheat, rice, or barley.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation shall be avoided.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.

Application Procedures

- Generally, loose straw shall be applied at a minimum rate of 4,000 pounds/acre, or as indicated in the project's special provisions, manufacturer's recommendation, either by machine or by hand distribution. If stabilizing emulsion will be used to anchor the straw mulch in lieu of incorporation, embankment or fill areas shall be roughened by rolling with a crimping or punching type roller or by track walking, before placing the straw mulch. Track walking should only be used where rolling is impractical and shall be considered when applying duff.
- The straw mulch must be evenly distributed on the soil surface.
- The mulch shall be anchored in place by using a tackifier or by "punching" it into the soil mechanically (incorporating).
- A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place.
- A tackifier is typically applied at a rate of 125 pounds/acre. In windy conditions, the rates are typically 180 pounds/acre.
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity. If the selected method is incorporation of straw mulch into the soil, then do as follows:
    - On small areas, a spade or shovel can be used.
    - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be punched into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a "crimper."
    - On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples,

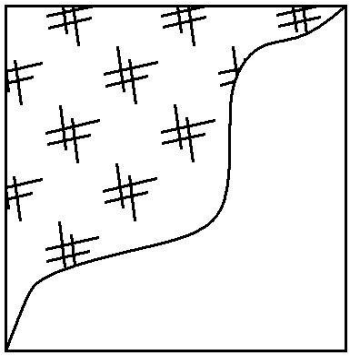
geotextile pins or wooden stakes (as described in EC-11 (Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats).

Maintenance and Inspection

- Inspections shall be conducted as required by the NPDES permit or contract specifications.
- The key consideration in Maintenance and Inspection is that the straw needs to last long enough to achieve erosion control objectives.
- An unbroken, temporary mulched ground cover shall be maintained while disturbed soil areas are non-active. Any damaged ground cover shall be repaired, and exposed areas re-mulched.
- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

EC-10 WOOD MULCHING

Refer to: ITD Standards and Specifications for Highway Construction, Sections 212, 621, and 711.
QPL Category: 621 Mulching



Standard Symbol

Definition and Purpose

- Wood mulching consists of applying a mixture of chipped or cut wood mulch, bark, or compost. Wood mulch is mostly applicable to landscape projects.
- The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

BMP Objectives

☐	**Perimeter Control**
☒	**Slope Protection**
☒	**Borrow and Stockpiles**
☒	**Drainage Areas**
☐	**Sediment Trapping**
☐	**Stream Protection**
☒	**Temporary Stabilizing**
☒	**Permanent Stabilizing**

Appropriate Applications

Wood mulching is considered a temporary soil stabilization (erosion control) alternative in the following situations:

- As a stand-alone temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetative cover can be established.
- As short-term, non-vegetative ground cover on slopes to reduce rainfall impact, decrease the velocity of sheet flow, settle out sediment, and reduce wind erosion.

Limitations

- Wood mulch may introduce unwanted species. Green material has the potential for the presence of unwanted weeds and other plant materials.
- Chipped or cut wood does not withstand concentrated flows and is prone to sheet erosion.
- Delivery system is primarily by manual labor, although pneumatic application equipment is available.

- Wood mulch should not be applied in winds that cause unwanted or excessive spreading of the mulch.

Design Parameters

There are many types of mulches, and selection of the appropriate type shall be based on the type of application and site conditions. Mulch use on construction projects may not be compatible with planned or future projects; therefore, the project team shall coordinate with state and local agencies.

Qualified Products List Criteria

See QPL Criteria 621.

Application Procedures

Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a punching type roller or by track walking. The construction-application procedures for mulches vary significantly depending upon the type of mulching method specified. Two methods are highlighted here:

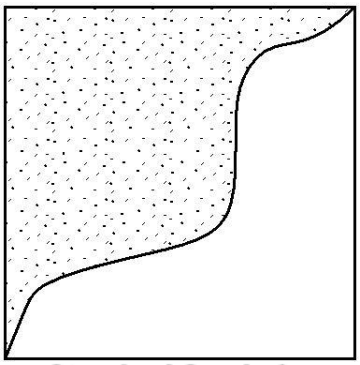
- Green material is produced by recycling vegetation trimmings such as chipped or cut shrubs and trees. Methods of application are generally by hand, although pneumatic methods are available. Materials composted must be indigenous. Noxious weeds shall not be composted.
    - It can be used as a temporary ground cover with or without seeding.
    - The green material shall be evenly distributed on-site to a depth of not more than 2 in.
- Chipped or cut wood is suitable for ground cover in ornamental or revegetated plantings.
    - Is conditionally suitable; see note under Limitations section above.
    - Shall be distributed by hand or another method approved by the Engineer.
    - Shall be evenly distributed across the soil surface to a depth of 3 inches.
- Mulch placement onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation shall be avoided.
- All material must be removed prior to re-starting work on the slopes. In some cases, wood mulch may be incorporated into the soil if approved by the Engineer.
- Mulch material should come from indigenous plants only.

Maintenance and Inspection

- Inspections shall be conducted as required by the NPDES permit or contract specifications.
- Regardless of the mulching technique selected, the key consideration in Maintenance and Inspection is that the mulch needs to last long enough to achieve erosion-control objectives. If the mulch is applied as a stand-alone erosion control method over disturbed areas (without seed), it shall last the length of time the site will remain barren or until final re-grading and revegetation.
- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, maintenance shall focus on longevity and integrity of the mulch.

EC-11 GEOTEXTILES, PLASTIC COVERS & EROSION CONTROL BLANKETS/MATS

Refer to: ITD Standards and Specifications for Highway Construction, Sections 212, 621, and 711.
ITD Standard Drawing P-2-C.
QPL Category: 621 Erosion Blanket – Rolls (RECPs)



Standard Symbol

Definition and Purpose

This BMP involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to temporarily stabilize disturbed soil areas and protect soils from erosion by wind or water.

BMP Objectives

- ☐ **Perimeter Control**
- ☒ **Slope Protection**
- ☒ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
- ☐ **Sediment Trapping**
- ☐ **Stream Protection**
- ☒ **Temporary Stabilizing**
- ☒ **Permanent Stabilizing**

Appropriate Applications

These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:

- Steep slopes, generally steeper than 3:1
- Slopes with loose soils or non-cohesive sandy and/or silty material.
- Slopes and disturbed soils where mulch must be anchored.
- Disturbed areas where plants are slow to develop.
- Channels with flows exceeding 3.3 feet/second.
- Channels to be vegetated
- Stockpiles
- Slopes adjacent to water bodies of environmentally sensitive areas (ESAs).

Limitations

- Blankets and mats are more expensive than other erosion control measures, due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment or where other measures are not applicable, such as channels.

- Blankets and mats are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (because staples and netting can catch in mowers).
- Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
- Non-degradable fabrics must generally be removed when permanent stabilization measures are ready to be installed. Failure to move these materials creates trash that may be environmentally harmful and may result in littering fines.
- Plastic results in 100 percent runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- The use of plastic should be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, may be installed.
- Geotextiles, mats, plastic covers, and erosion control covers have maximum flow rate limitations. The manufacturer shall be consulted for proper selection.

Material Selection

There are many types of erosion control blankets and mats, and selection of the appropriate type shall be based on the specific type of application and site conditions.

Geotextiles

- A wide variety of Geotextiles are available, dependent on their intended uses which range from separation of different materials (such as road bedding and underlying soils) to lining ponds and landfills. For temporary erosion control, geotextile fabrics typically consist of woven or non-woven fabrics that are used to line channels or slopes and are usually used in combination with rock or other mulches or riprap.
- Geomembrane is a more impervious type of geotextile and can be used to cover stockpiles or bare soil areas, where a more durable material (as compared to plastic sheeting) is desired. The use of geomembranes for this application will likely be very limited due to their higher costs.
- Geotextiles should be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent infiltration of surface waters under Geotextile. Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.
- Geotextiles may be reused if, in the opinion of the Engineer, they are suitable for the use intended.

Plastic Covers

- Plastic sheeting shall have a minimum thickness of 6 millimeters and shall be keyed in at the top of slope and firmly held in place with sandbags or other weights placed no more than 10 feet apart. Seams are typically taped or weighted down their entire length, and there shall be at least a 12 to 24 inches overlap of all seams. Edges shall be embedded a minimum of 6 inches in soil.

- Any sheeting failures shall be repaired immediately. If washout or breakages occur, the material shall be re-installed after repairing the damage to the slope.

Erosion Control Blankets/Mats (Rolled Erosion Control Products)

Degradable rolled erosion control products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100 percent degradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be degradable.

- **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately 1 year. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Excelsior (curled wood fiber)** blanket material shall consist of machine-produced mats of curled wood excelsior with 80 percent of the fiber 6 inches or longer. The excelsior blanket shall be of consistent thickness. The wood fiber shall be evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with a photodegradable extruded plastic mesh. The blanket shall be smolder-resistant without the use of chemical additives and shall be non-toxic and non-injurious to plant and animal life. Excelsior blanket shall be furnished in rolled strips a minimum of 48 inches wide and shall have an average weight of 0.1 pound per square foot (±10 percent) at the time of manufacture. Excelsior blankets shall be secured in place with wire staples. Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.
- **Straw blanket** shall be machine-produced mats of straw with a lightweight degradable netting top layer. The straw shall be attached to the netting with degradable thread or glue strips. The straw blanket shall be of consistent thickness. The straw shall be evenly distributed over the entire area of the blanket. Straw blanket shall be furnished in rolled strips a minimum of 6.5-feet-wide, 82-feet-long, and 0.055 pound per square foot. Straw blankets shall be secured in place with wire staples. Staples shall be made of 0.12- inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.
- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance revegetation. The material is furnished in rolled strips, which shall be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Coconut fiber blanket** shall be machine-produced mats of 100 percent coconut fiber with degradable netting on the top and bottom. The coconut fiber shall be attached to the netting with degradable thread or glue strips. The coconut fiber blanket shall be of consistent thickness. The coconut fiber shall be evenly distributed over the entire area of the blanket. Coconut fiber blanket shall be furnished in rolled strips with a minimum of 6.5-feet-wide, 82-feet-long, and 0.055 pound per square foot. Coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.
- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a degradable mat. It is designed to be used in conjunction

with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Straw coconut fiber blanket** shall be machine-produced mats of 70 percent straw and 30 percent coconut fiber with a degradable netting top layer and a degradable bottom net. The straw and coconut fiber shall be attached to the netting with degradable thread or glue strips. The straw coconut fiber blanket shall be of consistent thickness and shall be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket shall be furnished in rolled strips a minimum of 6.5-feet-wide, 82-feet-long, and 0.055 pound per square foot. Straw coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.

Non-degradable RECPs are typically composed of polyethylene, polypropylene, nylon, or other synthetic fibers. In some cases, a combination of degradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-degradable as well.

- **Plastic netting** is a lightweight biaxially-oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Plastic mesh** is an open-weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 2 inches. It is used with revegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be revegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Bonded synthetic fibers** consist of a three-dimensional geomatrix nylon (or other synthetic) matting. Typically, it has more than 90 percent open area, which facilitates root growth. Its tough root-reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high-strength continuous-filament geomatrix or net stitched to the bottom. The material is designed to enhance revegetation. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Qualified Products List Criteria

All rolled erosion control products shall meet the State of Idaho State Department of Agriculture Seed Laboratory or the North American Weed Management Association (NAWMA) noxious weed-free certification requirements prior to approval.

All RECPs shall:

- Have independents test results submitted shall be from either the National Transportation Product Evaluation Program (NTPEP) or an approved equivalent laboratory.
- Meet or exceed the Standard Specifications recommendations for slope and channel applications as outlined by the Erosion Control Technology Council:

  http://www.dlr.enr.state.nc.us/TAC%20website/2008_04_23/SpecJune06Ver5.pdf

Site Preparation

- Prepare the site properly to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation, or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 inches of topsoil. When using a fabric or mat that is designed to be used in conjunction with seeding or revegetation, follow the manufacturer's guidelines for proper seedbed preparation, seed application, and/or planting.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown. Wire staples shall be minimum of 11 gauge.
- Metal stake pins shall be 0.188-inch-diameter steel with a 1.5-inch steel washer at the head of the pin.
- Wire staples and metal stakes shall be driven flush to the soil surface.
- All anchors shall be a minimum of 6 inches long and have sufficient penetration to resist pullout. Longer anchors may be required for loose soils as determined by the responsible party or by manufacturer's installation guidelines.

Installation on Slopes

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6-inch-deep by 6-inch-wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 6 inches and staple every 3 feet.
- When blankets must be spliced, place blankets end over end (shingle style) with 6 inches of overlap. Staple through overlapped area, approximately 12 inches apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor them and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges.
    - Steep slopes (1:1 to 2:1) require a minimum of 2 staples/yd^2.
    - Moderate slopes (2:1 to 3:1) require a minimum of 1.5 staples/yd^2, placing 1 staple/yd on centers.
    - Gentle slopes require a minimum of 1 staple/yd^2.

Installation in Channels

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 inches deep and 6 inches wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 inches deep and 6 inches wide across the channel at 25- to 30-foot intervals along the channels.
- Cut longitudinal channel anchor slots 4 inches deep and 4 inches wide along each side of the installation to bury edges of matting. Whenever possible, extend matting 2 to 3 inches above the crest of the channel side slopes.
- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12-inch intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 6 inches.
- Secure these initial ends of mats with anchors at 12-inch intervals, backfill, and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 6-inch overlap.
- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot, then fold back against itself. Anchor through both layers of mat at 12-

inch intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.

- Alternate method for non-critical installations. Place two rows of anchors on 6-inch centers at 25- to 30-foot intervals in lieu of excavated check slots.
- Shingle lap ends by overlapping uphill on top of downhill fabric a minimum of 12 inches to prevent water from flowing underneath fabric at splice locations. See schematics at end of this BMP.
- Place edges of outside mats in previously excavated longitudinal slots. Anchor using prescribed staple pattern, backfill, and compact soil.
- Anchor, fill, and compact upstream end of mat in a 6-inch by 12-inch terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement)

- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes, or brooms for fine grading and touch up.
- Smooth out soil filling, just exposing top netting of mat.

Blanket Removal

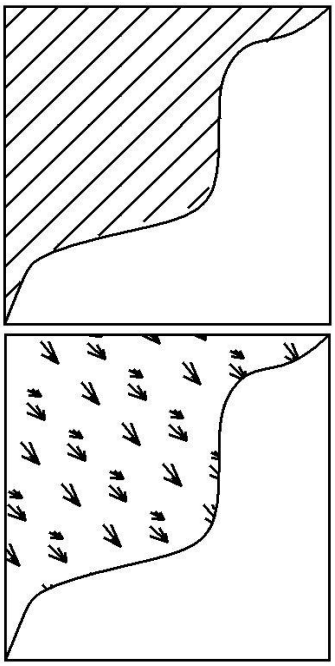
When no longer required for work, non-degradable temporary blankets shall be removed from the site and disposed.

Maintenance and Inspection

- Inspections shall be conducted as required by the NPDES permit or contract specifications.
- Areas treated with temporary geotextiles, mats, blankets, and other covers shall be maintained to provide adequate erosion control. Temporary geotextiles, mats, blankets, and other covers shall be reapplied or replaced on exposed soils when greater than 10 percent of the previously treated area becomes exposed or exhibits visible erosion or as determined by the responsible party.
- Any failures shall be repaired immediately.
- If washout or breakage occurs, reinstall the material after repairing the damage to the slope or channel.

EC-12 VEGETATION/SEEDING

For assistance, consult the Roadside Manager in the ITD Headquarters Maintenance Section.
Refer to: ITD Standards and Specifications for Highway Construction, Sections 212 and 621.



Standard Symbol

Definition and Purpose

Temporary vegetation/seeding (cover crop) is the process of growing, from seed, a vegetative cover on disturbed areas for short-term erosion control during construction and maintenance soil-disturbing activities.

The purpose of temporary vegetation/seeding is to stabilize slopes and surface areas by using rapid-germinating and fast-growing grasses or legumes, such as annual rye, cereal (barley, wheat, oats), or sterile hybrid grains. Added to approved hydro-mulch/tackifier/bonding fibers, vegetation/seeding can provide additional and cost-effective temporary soil stabilization and erosion control.

Temporary vegetation can act as a nurse crop that, when added to permanent seeding, can quickly provide an additional root system that helps stabilize and anchor disturbed surface areas subject to extensive erosion. Temporary vegetation allows permanent vegetation time to establish.

BMP Objectives

- ☐ **Perimeter Control**
- ☒ **Slope Protection**
- ☒ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
- ☐ **Sediment Trapping**
- ☐ **Stream Protection**
- ☒ **Temporary Stabilizing**
- ☒ **Permanent Stabilizing**

The primary advantages of temporary vegetation/seeding are as follows:

- Is generally inexpensive and easy to obtain (can be tank-mixed with approved hydro-mulches, tackifiers, and/or bonding fibers).
- Quickly provides effective soil stabilization when conditions (favorable precipitation and temperatures) are conducive to good germination and plant growth.

- Adds to permanent seeding as a nurse crop or can be over-seeded with permanent seeding
- Provides a quicker short-term vegetative growth that will assist in erosion control until the permanent vegetation starts to grow and becomes established.
- Retards the invasion and growth of undesirable weeds and provides good aesthetic qualities.
- Complements other temporary BMP erosion control measures (reduces sedimentation and the cost associated [during construction] with maintenance of other erosion control measures, such as cleaning out in front of ditch checks and sediment trap basins).
- Can be repaired or reseeded after disturbance.

Appropriate Applications

- Typical disturbed areas to consider for temporary vegetation are slides, washouts, slopes, guttering, topsoil stockpiles, temporary excavation or embankment areas, dikes, berms, dams, sediment trap basins (sides and top), and road banks.
- Temporary vegetation should be considered for any disturbed area where the potential for erosion may occur or where the disturbed area is required to receive a temporary soil stabilization BMP because of exposure to stormwater or wind after the last construction or maintenance activity (time limitation).
- Temporary vegetation can also be applied on surface areas prior to permanent vegetation to allow permanent seeding to take place at the appropriate times (season of seeding).

Limitations

Establishment of temporary vegetation depends on favorable temperatures and precipitation. The optimum time for establishing temporary vegetation is usually in the spring (January-May) or fall (September-December). Unless establishment water is used, temporary seeding in the summer months (June-August) is usually not effective and other temporary soil stabilizations and erosion control BMPs should be considered or relied upon. The same limitation applies to temporary seeding on frozen ground or in deep snow.

Design Parameters

- Temporary vegetation should be utilized in combination with other temporary erosion control practices. Vegetation/seeding would consist of the hydro application of approved seed (optional), soil binders, tackifiers, bonding fibers, and wood fiber mulch at the prescribed rate.
- Some soil binders and tackifiers will impede or interfere with seed germination and plant growth.
- Additional information can be obtained from TN Plant Materials No. 24, Improved Grass, Forb, Legume, and Woody Seed Species for The Intermountain West (USDA – Natural Resources Conservation Service) or the ITD Roadside Vegetation Guidebook.

Construction Guidelines

- Install structural or more permanent erosion control practices, such as dikes, basins, and berms before seeding.
- Use clean, high-quality certified seed. Ensure proper selection of seed through coordination with appropriate ITD staff.
- Loosen compacted soil prior to seeding.
- Mix the temporary seed with other approved soil stabilization and erosion control products to provide better erosion control results. In the event that the seeding fails, the other products may provide the required temporary erosion control.
- Re-seed when necessary.
- Make field adjustments as necessary to ensure proper performance.

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- Check for areas where protective measures (such as mulches or matting) have failed, or where plant growth is not proceeding at the desired rate. Indicate which areas need to be reseeded and where other treatments are necessary to establish the desired vegetative cover. Apply seed or other treatments immediately.
- Removal of temporary vegetation prior to a more permanent BMP such as permanent seeding is usually not necessary. If temporary vegetation is too high for a permanent vegetation application to come into positive contact with the soil, mowing or cutting the temporary vegetation may be required.

EC-13 DUST CONTROL

Refer to: ITD Standard Specifications, Sections 104, 106, 205, 212, 711, 621, and 711.

BMP Objectives

- ☐ **Perimeter Control**
- ☒ **Slope Protection**
- ☒ **Borrow and Stockpiles**
- ☐ **Drainage Areas**
- ☐ **Sediment Trapping**
- ☐ **Stream Protection**
- ☒ **Temporary Stabilizing**
- ☐ **Permanent Stabilizing**

Definition and Purpose

Fugitive dust is primarily produced by traveling vehicles and construction machinery, but may also include blowing wind (see EC-14). This BMP shall be used to prevent or reduce fugitive dust situations, which include protecting the soil surface, roughening the surface, or reducing the wind velocity at the surface. The primary dust control practices include:

- **Temporary surface/soil stabilization** using wood fiber, recycled paper, straw, and mulch in combination with soil binders, tackifiers, or bonding fibers. Cover crop seed, soil binders and tackifiers alone or combined may also be used to reduce fugitive dust.
- **Temporary vegetation** (seeding) (see Limitations below).
- **Gravel or rock**.
- **Surface roughening** using disking or tilling implements to build small ridges and valleys perpendicular to the prevailing wind.
- **Barriers** comprised of wood, snow or silt fence or straw bales placed perpendicular to prevailing wind current.
- **Water** is best suited for use on haul, access, or detour roads (see Limitations below).
- **Dust oil, black liquor (lignin), and magnesium chloride solution or other commercially qualified products** (see Limitations below).

Appropriate Applications

- The time and extent of dust control varies greatly and depends on the season, site characteristics, and area within the state. Dust abatement should be a consideration in the initial application.
- Clearing and grading activities create disturbed areas, which may require dust control measures.

- As a standard practice, all exposed areas should be stabilized. Surface erosion control measures for stormwater can also prevent erosion due to wind.

Limitations

- Water for dust abatement is very effective temporarily but is quite costly long-term.
- Barriers, such as fences, may require removal and replacement several times during a construction project and may not be effective.
- Chemicals such as black liquor or magnesium chloride and oils sold for dust control may be detrimental to adjacent vegetation and soils for revegetative purposes and may adversely affect runoff.
- Temporary vegetation (seeding) alone is not practical in arid or semi-arid areas of the state unless establishment water is used. Temporary vegetation should only be considered in combination with other dust abatement measures.
- Chemicals used for dust control may require approval by ITD, EPA, and the Department of Environmental Quality.
- Commercial products not on ITD's Qualified Products List (QPL) shall be coordinated with and approved by the Product Review Committee.

Design Parameters

- The best method for controlling fugitive dust is to prevent the movement of dust. Measures to accomplish dust control can be:
  - Limiting the amount of bare soil exposed at any one time.
  - Locating haul, access, detour roads, and staging areas to minimize exposure.
  - Including measures such as sequencing, etc., in the SWPPP.
- When designing the project, consider the most effective method or methods for dust abatement. Refer to other erosion and sediment control BMPs.
- The best method for controlling fugitive dust is to prevent the movement of dust. The Contractor shall assess potential problems and fugitive dust generation at the project site by considering the type of exposed soil, amount and type of equipment used, prevailing wind direction and the effect of other specified erosion and sediment control measures may cause.
- Provide dust control on haul, access, detour roads, and staging areas. Check that chemicals used for dust control are not detrimental to adjacent vegetation. Apply protective surface measures as soon as possible to minimize wind erosion. Sequence or schedule work to reduce exposed areas subject to wind erosion. Avoid over-application of water for dust abatement.
- Make field adjustments as necessary to provide for effective wind erosion control measures.

Qualified Products List Criteria

See EC-8 (Soil Binders).

Maintenance and Inspection

- Inspections shall be conducted as required by the NPDES permit or contract specifications.
- Dust control requires constant attention and should be done quickly and effectively when conditions require. If control measures are applied, check at regular intervals.
- Accumulated sediment shall be removed from the barrier and disposed in an approved location.
- Chemical applications, if approved, shall be applied at the manufacturer's recommendations and intervals.

EC-14 WIND EROSION CONTROL

Refer to: ITD Standard Specifications, Sections 205 and 212.

BMP Objectives

- ☐ **Perimeter Control**
- ☒ **Slope Protection**
- ☒ **Borrow and Stockpiles**
- ☐ **Drainage Areas**
- ☐ **Sediment Trapping**
- ☐ **Stream protection**
- ☒ **Temporary Stabilizing**
- ☐ **Permanent Stabilizing**

Definition and Purpose

Dust or wind erosion control consists of applying water, soil binders, dust palliatives, or other soil stabilization BMPs as necessary to prevent or alleviate dust nuisance and to comply with state and local permit regulations. Covering stockpiles or exposed soil areas with blankets, mats, or mulches is an alternative to applying water, soil stabilizers, or dust palliatives.

Appropriate Applications

This practice is implemented on all exposed soils subject to wind erosion. Materials or topsoil stockpiles may also require some form of protection from wind, especially in open, arid, or semi-arid regions of the state.

Limitations

Effectiveness depends on soil, temperature, humidity and wind velocity. Soil binders are to be used where specified in the contract plans or as directed by the engineer. The Contractor may determine when and where to apply dust palliatives in order to comply with applicable regulations.

Design Parameters

- Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment shall be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit shall be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet IDEQ requirements. Non-potable water shall not be conveyed in tanks or drain pipes that will be used to convey potable water, and there shall be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances shall be marked “NON-POTABLE WATER - DO NOT DRINK.”

- Materials applied as temporary soil binders will also provide wind erosion control benefits.
- Application of dust palliatives are subject to sample collection and testing for compliance with applicable regulations of the Idaho Administrative Code.

Qualified Products List Criteria

See EC-8 (Soil Binders).

Maintenance and Inspection

Conduct inspections as required by the NPDES permit or contract specifications.

EC-15 SNOW MANAGEMENT

BMP Objectives

- ☒ **Perimeter Control**
- ☐ **Slope Protection**
- ☐ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
- ☐ **Sediment Trapping**
- ☐ **Stream Protection**
- ☐ **Temporary Stabilizing**
- ☐ **Permanent Stabilizing**

Definition and Purpose

Snow management involves the relocation of snow by transporting, plowing, dozing, and/or blowing snow to locations where erosion impacts are less likely to occur during melting. This BMP can be used in conjunction with snow fences.

Appropriate Applications

This BMP is appropriate when construction projects extend through winter months and at locations (such as high mountain areas) where snow accumulation can be significant.

Limitations

This BMP may not be appropriate in areas with little snow accumulations and where access is limited.

Design Parameters

- Utilize snow blowers, snowplows, or other equipment to remove snow or move snow to less erosion-sensitive areas with proper drainage.
- Modify existing snowplow operations so snow is not piled in erosion-sensitive areas.
- Remove heavy snow accumulations from around temporary structures such as culverts to minimize ice jamming and structure failure during freeze-thaw cycles.
- Place snow in areas where soil/cover is stable and snowmelt will have a less significant impact.

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- Remove or move snow as needed to reduce melt impacts.

EC-16 SNOW ACCUMULATION MANAGEMENT

BMP Objectives

- ☒ **Perimeter Control**
- ☐ **Slope Protection**
- ☐ **Borrow and Stockpiles**
- ☒ **Drainage Areas**
- ☐ **Sediment Trapping**
- ☐ **Stream Protection**
- ☐ **Temporary Stabilizing**
- ☐ **Permanent Stabilizing**

Definition and Purpose

At construction sites, snow can accumulate on disturbed areas and in drainages prior to cover being established. This BMP involves the installation of snow barriers to reduce the amount of erosion on disturbed areas. Temporary snow barriers are most commonly constructed from synthetic materials; however, boards, hay bales, rocks, and other similar materials can be used as well.

Appropriate Applications

In areas where snow drifts of 5 to 10 feet in depth occur, snow fences can be installed to prevent snow from accumulating on sensitive areas. This practice will minimize erosive snowmelt runoff and ice blockages. Snow fencing can be used in conjunction with EC-2 (Preservation of Existing/Natural Vegetation) and EC-14 (Wind Erosion Control).

Limitations

Snow fences are difficult to install on steep slopes and rocky surfaces. Snow fences may not be cost effective when large areas need to be protected from snow accumulation. Removal at the end of the project is manpower intensive.

Design Parameters

- Snow barriers shall be installed adjacent to disturbed areas, perpendicular to the prevailing wind direction, and upwind of disturbance area.
- Fences in moderate snow areas should be 4 to 6 feet in height. Two or more parallel rows of snow fence may be used in areas of heavy snow accumulations.
- Synthetic fence density (the ratio of the solid area to the area of the fence) should be between 40 and 60 percent.
- Fences should be placed, if practical, at a distance of 15 to 20 times the fence height from the area to be protected.

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- Remove snow barriers when the areas to be protected have been stabilized.